25(2); 28(5) PHASE I BOOK EXPLOITATION SOV/2977

Smilyanskiy, Zalman Gershevich

Osnovy tekhniki kontrolya razmerov v mashinostroyenii (Fundamentals of Dimensional Inspection in Machine Building) Moscow, Mashgiz, 1959. 245 p. Errata slip inserted. 18,000 copies printed.

Reviewer: A.N. Malov, Candidate of Technical Sciences; Ed.: B.V. Smirnov, Engineer; Managing Ed. for Literature on Metalworking and Tool Making: R.D. Beyzel'man, Engineer; Ed. of Publishing House: A.F. Balandin; Tech. Eds.: A.Ya. Tikhanov and V.D. El'kind.

PURPOSE: This book is intended for workers in the machine-building industry. It may also be used by inspection personnel studying to improve their skill.

COVERAGE: The book deals with handling and use of inspection instruments, inspection technique, and methods of measuring. Measuring

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SMIT , Otta

Improvement of edging saws. Drevo 18 no.1:38-39 Ja '63.

SMIRCIC, Petar, Major dr.

Staphylococcal enteritis caused by antibiotic treatment. Voj. san. pregl., Beogr, 13 no.7-8:355-359 July-Aug 56.

1. Mornaricka bolnica u Meljinama.
(PENICILLIN, inj. eff.
micrococcal enteritis (Ser))
(CHLORTETRACYCLINE, inj. eff.
micrococcal enteritis (Ser))
(ENTERITIS, etiol. & pathogen.
chlortetracycline & penicillin causing micrococcal enteritis (Ser))

SMIRCIC, Petar, sanitetski potpukovnik, dr.; CIKO, Zvonimir, sanitetski major, dr.

Contribution to the clinical picture in parathion poisoning. Vojnosanit. pregl. 18 no.9:793-795 S '61.

1. Medicinski centar ratne mornarice u Splitu, Interno odeljenje.

(PARATHION toxicol)

GASPAROV, Antun, sanitetski pukovnik, doc., dr.; SMIRCIC, Petar, sanitetski potpukovnik, dr.; FILIPOVIC, Brana, dr.; PETROVIC, Milentije, sanitetski kapetan, dr.; ELAKOVIC, Mihajlo, sanitetski kapetan I kl., dr.

Control of asymptomatic chronic gastritis with the aid of aspiration biopsy. (8 month control of 101 normal soldiers). Vojnosanit. pregl. 18 no.10:851-855 O '61.

1. Armijska bolnica u Beogradu, Interno odeljenje.

(GASTRITIS pathol) (BIOPSY)

GAŠPAROV, Anton

Yugoslavia

Docent Dr

Ward of Internal Disease of the Army Hospital — Belgrade (Interno odeljenje Armijski bolnice — Beograd), Belgrade; Head: Anton GAŠPAROV, Doc Dr.

Belgrade, Medicinski Pregled, No 8, 1962, pp 451-455.

"Morphological Changes in the Mucosa of Small Intestines in Taeniasas."

Co-authors:

SMIRČIĆ, P Dr of Medicine, Ward of Internal Diseases of the Army Hospital — Belgrade (Interno odeljenje Armijske bolnice — Beograd),

FILIPOVIĆ, B Dr of Medicine, Ward of Internal Diseases of the Army Hospital — Belgrade.

SMIRCIC, P., dr.; GASPAROV, A., puk. doc. dr.; FILIPOVIC, B., dr.

Hiatus hernia as a cause of hideropenic anemia. Med. glas. 16 no.6/6a:261-267 Je '62. (MIRA 16:7)

1. Interno odeljenje Armijske bolnice u Beogradu (Nacelnik: puk. doc. dr. A. Gasparov).

(ANEMIA HYPOCHROMIC)
(DIAPHRAGMATIC HERNIA)

GASPAROV, A., dr., doc., puk; SMIRCIC, P., dr.; FILIPOVIC, B., dr.; PETROVIC, M., dr.

Role of systematic rectoscopy and biopsy of the colonic mucosa in diseases of the digestive tract. (Result of 2,250 examinations). Med. glas. 16 no.6/a:255-258 Je '62.

1. Interno odeljenje Armijske bolnice u Beogradu (Nacelnik: puk. doc. dr. A. Gasparov).
(GASTROENTEROLOGY) (COLON) (PROCTOSCOPY)
(BIOPSY)

GASPAROV, A.; SMIRCIC, P.; FILIPOVIC, B.; PETROVIC, B.; ELAKOVIC, M.

Histological changes in the gastric mucosa in gastroduodenal ulcer and in normal young subjects. Vojnosanit. pregl. 19 no.2:101-104 F '62.

1. Armijska vojna bolnica u Beogradu, interno odeljenje.
(GASTRITIS) (DUODENAL ULCER) (STOMACH ULCER)
(BIOPSY)

GASPAROV, Antun, sanitetski pukovnik, doc., dr.; SMIRCIC, Petar, sanitetski potpukovnik, dr.; LEPES, Tibor, sanitetski potpukovnik, doc., dr.

Treatment of taeniasis with tin. Vojnosanit. pregl. 19 no.3: 198-201 Mr '62.

1. Armijska bolnica u Beogradu, Interno odeljenje.
(TIN) (TAPEWORM INFECTIONS)
(ANTHELMINTICS)

S

GASPAROV, Antun, sanitetski pukovnik, doc., dr.; SMIRCIC, Petar, sanitetski potpukovnik, dr.; FILIPOVIC, Brana, dr.; PETROVIC, Milentije, sanitetski kapetan, dr.; ELAKOVIC, Mihajlo, sanitetski major, dr.

Results of the histological examination of the mucous membrane of the colon in normal young subjects. Vojnosanit. pregl. 19 no.4:255-258 Ap '62.

1. Armijska bolnica u Beogradu, Interno odeljenje.
(COLON) (MUCOUS MEMBRANE)

GASPAROV, Antun, sanitetski pukovnik doc. dr; SMIRCIC, Petar, sanitetski potpukovnik dr; FILIPOVIC, Brana, vojni sluzbenik dr; PETROVIC, M., sanitetski kapetan dr; ELAKOVIC, M., sanitetski major dr

Roentgenological and histological comparisons in chronic gastritis in recruits. Vojnosanit. pregl. 19 no.11:769-773 N '62.

1. Armijska Bolnica u Beogradu, Interno odeljenje.
(GASTRITIS)

GASPAROV, Anton, sanitetski pukovnik, doc.dr.; SMIRCIC, Petar, sanitetski potpukovnik, dr.; FILIPOVIC, Brana, vojni sluzbenik, dr.; ELAKOVIC, Mihajlo, sanitetski major, dr.

Treatment of taeniasis with yomesan. Vojnosanit. pregl. 20 no.9: 590-593 S '63.

S

GASPAROV, Anton, dr.; FILIPOVIC, Brana,dr.; SMIRCIC, Petar, dr.;
ELAKOVIC, Mihajlo, dr.

Early diagnosis of restosigmoid carcinoma. Liječn. vjesn. 85
no.12:1353-1359 D'63

1. Iz Internog odjela Armijske bolnice u Beogradu.

*

SMIRGIC, P., ppuk. dr.; GASPAROV, A., doc. puk. dr.

Role and frequency of digestive diseases in th pathological picture of Yugoslavia. Med. glas. 18 no.6:158-160 Je-Jl '64.

1. Interno odeljenje Armijske bolnice u Beogradu (Nacelnik: doc. puk. dr. A. Gasparov).

SMIRDIN, P.M., kandidat tekhnicheskikh nauk.

Conditions for drying blank beech blocks. Der. prom. 6 no.4:14-15 Ap '57. (MLRA 10:6)

1. TSentral'nyy nauchno-issledovatel'skiy institut Mashdetal' Ministerstva legkoy promyshlennosti.
(Lumber--Drying) (Beech)

SMIRDIN, P.M., kand.tekhn.nauk

Drying hornbeam lumber. Der. prom. 7 no.8:16 Ag '58. (MIRA 11:9)

1. TSentral'nyy nauchno-issledovatel'skiy institut Mashdetal' Mosoblsovnarkhoza.
(Lumber--Drying)

ASTAF'YEV, B.A.; BELOVA, Ye.I.; SMIRDIN, P.M.

Drying wood impregnated with sodium-chloride solution. Der.prom. 8 no.3:9-10 Mr '59. (MIRA 12:4)

1. Nerekhtskaya kabluchnaya fabrika Kostromskogo sovnarkhoza.
(Lumber--Drying)

VINOGRADOVA, A., inzh.; SMIRDINA, N., starshiy nauchnyy sotrudnik

Hotbeds with a new system of soil heating. Sel'. stroi. 15 no. 2:19-20 F '61. (MIRA 14:5)

1. NIIsel'stroy.

(Hotbeds)

SMIRDINA, N., kand.tekhn.nauk; LOBANOVA, L., inzh.

Heat insulation of rural underground networks. Sel'. stroi. no.7:19-21 '62. (MIRA 15:8)

(Insulating materials) (Pipe)

SHIRDI[illegible] A, [illegible]

SHIRDINA, N. F. - "Effect of Moisture Content on the Free-flow Properties of Fuel and its Drying in the Pulverizers in the Fuel-feed Circuit." Moscow Inst of Engineers of Municipal Consruction of the Mosgorispolkom, Moscow, 1955 (Dissertations for Degree of Candidate of Technical Sciences)

SO: Knizhnaya Letopis' No. 26, June 1955, Moscow

SMIRDINA, N.P., kand.tekhn.nauk; LOBANOVA, L.N., inzh.

Choosing insulated and waterproof designs when installing hot-water pipes in a rural locality. Sbor. nauch. soob. NIIsel'stroia no.3:54-60 '60. (MIRA 15:6)

(Heating pipes)

SENKOV, Fedor Vasil'yevich; SMIRDINA, Nina Pavlovna; LOBANOVA, Lyudmila Nikolayevna; VINOGRADOVA, G.M., red.; TARKHOVA, K.Ye., tekhn. red.

[Heating and heat supply of farm buildings and installations] Otoplenie i teplosnabzhenie sel'skikh zdanii i sooruzhenii. Moskva, Gosstroiizdat, 1963. 146 p. (MIRA 16:12)
(Farm buildings--Heating and ventilation)

SMIRDINA, YE. A.

USSR/Medicine - Dysentery Jul 53

"Comparative Evaluation of Methods for the Laboratory Diagnosis of Dysentery," S. A. Botvinik, N. F. Popkova, Ye. A. Smirdina, Chair of Microbiol, Yaroslavl' Med Inst

Zhur Mikro, Epid, i Immun, No 7, pp 68-71

On the basis of the results described, the reaction of precipitation isolated hapten and the reaction of agglutination of mixed cultures can be recommended as useful methods supplementing the routine bacteriological examination. These

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methods permit a diagnosis within 24 hrs, while a bacteriological test requires 3-4 days. The reaction of complement fixation (RSK) is not specific enough and for that reason uncertain. The RSK procedure developed by Ginzburg et al. at the Inst im. Mechnikov [not further identified] was used.

SMIRENIN, B. A. ed.

Spravochnik po radiotekhnike. Moskva, Gos. energ. izd-vo, 1950.
784 p., diagrs., tables.
Extensive bibliographies at the end of chapters.
Title tr.: Manual of radio engineering.

TK6550.S4978

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

VINITSKIY, Arkadiy Savvich; SMIRENIN, B.A., retsenzent; IVANUSHKO, N.D., red.; SMUROV, B.V., tekhn. red.

[Fundamentals of continuous-wave radar] Ocherk osnov radiolokatsii pri nepreryvnom izluchenii radiovoln. Moskva, Izd-vo "Sovetskoe radio," 1961. 494 p. (MIRA 15:2)
(Radar)

MIDDLTON, D.[Middleton, David]; SMIRENIN, B.A.[translator]; LEVIN, B.R., red.; IVANUSHKO, N.D., red.; SMUROV, B.V., tekhn. red.

[An introduction to statistical communication theory]Vvedenie v statisticheskuiu teoriiu sviazi. Pod red. B.R.Levina. Moskva, Izd-vo "Sovetskoe radio," Vol.1. 1961. 781 p. (MIRA 15:11)

(Information theory) (Telecommunication)

SMIRENINA, L. B.

Evolution; Darwin, Charles Robert, 1809-1882

Letters of a great biologist. L. B. Smirenina, K. S. Fabri, Agrogiologiia, no. 6, 1951.

SO: Monthly List of Russian Accessions, Library of Congress, April 1952 ~~1953~~, Uncl.

[illegible] Prokhorova)

"THE AVERAGE NUMBER OF SPECTRUM OF PROMPT NEUTRONS EMITTED IN FISSION INDUSED BY FAST NEUTRONS".

By I. I. Bondarenko, B. D. Kuzminov, L. S. Kutsayeva, L. I. Prokhorova and G. N. Smirenkin.

Report presented at 2nd UN Atoms-for-Peace Conference, Geneva, 9-13 Sept. 1958.

Smirenkin, G.N.

AUTHORS: Smirenkin, G. N., Bondarenko, I. I., Kutsayeva, L. S. 89-4-1/35
Mishchenko, Kh. D., Prokhorova, L. I., Shemetenko, B. P.

TITLE: Mean Prompt Neutron Numbers in the Fission of U^{233}, U^{235} and Pu^{239} by 4 and 15 MeV Neutrons (Sredneye chislo mgnovennykh neytronov pri delenii U^{233}, U^{235}, Pu^{239} neytronami s energiyey 4 i 15 MeV).

PERIODICAL: Atomnaya Energiya, 1958 [redacted]. Nr 2, pp. 188-190 (USSR)

ABSTRACT: The following measuring results were obtained:

Isotope to undergo fission	ν_T +)	E_n in MeV	$\nu(E)/\nu_T$	$\nu(E)$	$\Delta\nu/\Delta E$
U^{233}	2,55±0,03	4,0±0,3 MeV	1,20±0,04	3,[illegible]±0,12	0,127±0,025
		15,0±0,5 MeV	1,73±0,06	4,[illegible]2±0,17	0,124±0,011
U^{235}	[illegible],47±0,05	4,0±0,3 MeV	1,22±0,04	3,01±0,12	0,1[illegible]6±0,025
		15,0±0,5 MeV	1,82±0,07	4,51±0,19	0,135±0,012
Pu^{239}	[illegible],91±0,06	4,0±0,3 MeV	1,18±0,03	3,[illegible]3±0,11	0,131±0,022
		15,0±0,5 MeV	1,62±0,06	4,71±0,20	0,121±0,015

+) ν_T = mean neutron number liberated in the fission by thermic neutrons.

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Mean prompt neutron numbers in the fission of U^{233}, U^{235} and [illegible]-2-14/32
Pu^{239} by 4 and 15 MeV neutrons.

There are 1 table and 12 references, 5 of which are Slavic.

[illegible] July 6, 1957

[illegible] Library of Congress

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1. Neutrons-Energy Measurement 2. Uranium 233 fission-Measurement 3. Uranium 235 fission-Measurement 4. Plutonium 239 fission-Measurement

Smirenkin, G. N.

SOV/89-5-3-6/15

AUTHORS: Leypunskiy, A. I., Abramov, A. I., Andreyev, V. N., Baryshnikov, A. I., Bondarenko, I. I., Galkov, V. I., Golubev, V. I., Gol'ko, A. V., Guseynov, A. G., Kazachkovskiy, O. D., Kozlova, N. V., Krasnoyarov, N. V., Kuz'minov, B. D., Morozov, V. N., Nikolayev, M. N., Smirenkin, G. N., Stavisskiy, Yu. Ya., Ukraintsev, F. I., Usachev, L. N., Fetisov, N. I., Sherman, L. Ye.

TITLE: Investigations of the Physics of Reactors With Fast Neutrons. I (Issledovaniya po fizike reaktorov na bystrykh neytronakh)

PERIODICAL: Atomnaya energiya, 1958, Vol. 5, Nr 3, pp. 277-287 (USSR)

ABSTRACT: Since 1950 experiments have been carried out with fast reactors by the Main Administration of the Use of Nuclear Energy. At the Physics Institute of this organization the fast-neutron reactor [redacted], was put into operation early in 1955, and the reactors [redacted] 2 and [redacted] 3 followed in 1956 and 1957 respectively.

Reactor [redacted] -1:

Power	50 kW
Active zone	diameter and height ~13 cm
Fuel	plutonium diameter ~1 cm
Canning	thin steel tube

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The active zone may be surrounded by 2 mobile shields. Shield 1 consists of depleted uranium, and shield 2 of copper. An additional shield can be fastened on one side on to the shield with a diameter of 70 cm, so that total thickness can be increased to 60 - 100 cm. With this reactor investigations were carried out of: the spatial and energy distribution of the neutrons, of which the results are shown in a table for Pu^{239} (n,f), U^{235} (n,f), U^{235} (n,f), U^{238} (n,f), Np^{237} (n,f), Pu^{240} (n,f), U^{238} (n,γ), Au^{197} (n,γ), U^{238} (n,2n). Measurement of the conversion factor. The latter was determined experimentally as amounting to 2,4 to 2,5. It was also calculated by means of the multi-group computation method in S_4-th approximation (Ref 1). The electronic computer was used under the supervision of Professor Ye. S. Kuznetsov. For computation the experimental values for μ of V. I. Kalashnikova (Ref 5), G. N. Smirenkin (Ref 6), B. D. Kuz'minov (Ref 7), and for α the values obtained by P. Ye. Spivak (Ref 8), V. N. Andreyev (Ref 9) were used. As a result of computations the coefficient was found to amount to 2,6.

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The Distribution of Neutrons in Uranium

The cross sections of the various reactions for the equilibrium spectrum and for the asymptotic spectrum of the depleted uranium was determined both theoretically and experimentally. The asymptotic length of diffusion determined experimentally and theoretically amounts to 9,1 ± 0,1 cm. The average number of fissions of uranium 238 caused by fission neutrons amounts to 0,17 ± 0,01. This is in agreement with the data given by reference 10.

Furthermore, the influence exercised by the resonance structure of the cross sections upon the spatial distribution of the neutrons is investigated. Kh. D. Mishchenko showed that for neutrons with 24 keV the total cross section for copper is reduced by about three times its amount with a modification of target thickness of from 0,5 to 30 mm. There are 12 figures, 7 tables, and 15 references, 9 of which are Soviet.

(Continued on abstract 7/15)

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SOV/89-[illegible]-7-15

AUTHORS: Leypunskiy, A. I., Abramov, A. I., Andreyev, V. N., Baryshnikov, A. I., Bondarenko, I. I., Galkov, V. I., Golubev, V. I., Gul'ko, A. D., Guseynov, A. G., Kazachkovskiy, O. D., Kozlova, N. V., Krasnoyarov, N. V., Kuz'minov, B. D., Morozov, V. N., Nikolayev, M. N., Smirenkin, G. N., Stavisskiy, Yu. Ya., Ukraintsev, F. I., Usachev, L. N., Fetisov, N. I., Sherman, L. Ye.

TITLE: Investigations of the Physics of Reactors With Fast Neutrons. II (Issledovaniya po fizike reaktorov na bystrykh neytronakh) (Continued from abstract 6/15)

PERIODICAL: Atomnaya energiya, 1958, Vol. 5, Nr 3, pp. 288-293 (USSR)

ABSTRACT: The reactivity and the kinetics of the reactor were measured. It could be shown that in the center of the active zone the weight of the 5 MeV neutrons is higher by ~15% than that of 250 MeV neutrons. The effective yield of the delayed neutrons in the reactor with a uranium shield exceeds that of a reactor with a copper shield by 1,4 times its amount.
Reactor [redacted] 3:
The active plutonium zone is the same as in reactor БР-1. In the center of the reactor a water-uranium channel is provided, which is separated from the plutonium zone by a uranium layer

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of 8 cm thickness. The uranium-water lattice consists of cylindrical slugs of normal uranium, which have a diameter of 35 mm. The canning material is aluminum. The ratio between water and uranium is 0,35. The lattice spacing is 40 mm. Measurements carried out with the water-uranium lattice instead of with the pure uranium layer showed:
1) The conversion factor is reduced from 2,45 ± 0,10 to 1,7 ± 0,2.
2) In the case of a fixed power output of the active zone the velocity with which the total quantity of plutonium 239 and uranium 235 is formed was increased by 35%.
3) The velocity with which plutonium is produced increased by 1,8 times its amount.
4) In the case of a fixed power output of the active zone the total power output of the reactor is increased by 2,2 times its amount.
Reactor [redacted]-2:
This reactor was described more in detail in references 12 and 13. Its nominal power output is 120 kW, the maximum output is 200 kW. In the active zone of the reactor БР-2, which consists of plutonium rods, mercury is used as a coolant, which takes up

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~17% of the total volume of the active zone. The regulating rods (interior of shield) are made from a copper-nickel alloy. The external shield consists of uranium slugs canned with stainless steel. Thickness ~25 cm. The uranium shield is surrounded by copper of 15 cm thickness.
The presence of mercury in the active zone leads to a decrease of the content of fast neutrons in the spectrum. The conversion factor was 1,6 ± 0,2.
Theoretically the kinetic equation for this reactor was calculated by G. I. Marchuk according to the method developed by V. S. Vladimirov. Theoretical calculation of the critical mass was carried out with an error of 4%, and that of the effectiveness of the regulating rods with an error of 6%. The effective yield of the delayed neutrons was found to amount to 0,2[illegible]%, while the experimental value was 0,24 ± 0,04%. There are 7 figures, 1 table, and 13 references, 9 of which are Soviet.

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Smirenkin G. N.

AUTHORS: Kuz'minov, B. D., Smirenkin, G. N. 56-2-31/51

TITLE: The Systematics of the Mean Number of Instantaneous Fission Neutrons ν (Sistematika srednego chisla mgnovennykh neytronov deleniya ν)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1958, Vol 34, Nr 2, pp 503-504 (USSR)

ABSTRACT: The present work compares the experimental data for ν (references 1-8) with the results of the calculations on the below mentioned conditions. The authors investigate the masses of only two fragments, namely M_{light} of a light fragment and M_{heavy} of a heavy fragment. This corresponds to the most probable way of fission. In the computation of the energy of fission the mass M(A, Z) of the nucleus subjected to fission was determined by means of the semi-empiric formula of A. E. S. Green (reference 9), and the masses M(A_{light}, Z_{light}), M(A_{heavy}, Z_{heavy}) were computed by means of the formula of Fermi with the correction factors of P. Fong (reference 10) which take into account the shell structure of the nuclei. For reasons of

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simplicity it was assumed that $A_{heavy}=140$. The initial charges Z_{light} and Z_{heavy} of the fission fragments are computed using the hypothesis of the same β-decay chains. The kinetik energy E_k of the fission fragments was calculated by means of the formula $E_k = c_1 Z^2 A^{-1/3}(1 - c_2 Z^2/A)$. The constants c_1 and c_2 are selected in such a way that the last mentioned formula coincides best with the experimental values of ν in the equation of the balance of energy. The mean energy transported by instantaneous neutrons called E_n consists of the binding energy $E_{binding}$ of this very neutron in the nuclear fragment and of its mean kinetic energy 2T in relation to the fragment at rest. The temperature T of the fragment after the emission of the neutron was estimated on the basis of the data on the spectra of the fission neutrons of U^{233}, U^{235}, Pu^{239} (fission by slow neutrons) as well as on the spontaneous fission of Cf^{252}. The values of $E_{binding}$ were calculated according to the formula of Fermi-Fong (reference 10) for masses. Some more conditions laid down here are mentioned. For the purpose of comparison with the results of calculations all experimental values of ν for the fission

The Systematics of the Mean Number of Instantaneous Fission Neutrons ν 56-2-31/51

caused by neutrons were traced back to the values for ν for the spontaneous fission of the corresponding compound nuclei, and this was done using the formula $d\nu/dE_x = 1/E_n$. The correctness of this operation was proved by certain comparisons mentioned here. A diagram shows the families of curves for ν as function of A for various Z. Most experimental data coincide satisfactorily with the results of calculations. The non-momotonous course of the function $\nu(A)$ is connected with the shell structure of the nuclear fragments.

SUBMITTED: September 30, 1957

AVAILABLE: Library of Congress

1. Mlight-Light fragment-Analysis 2. Mheavy-Heavy fragment-Analysis

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SOV/56-35-2-44/60

21(7)

AUTHORS: Nesterov, V. G., Smirenkin, G. N.

TITLE: The Cross Section of the Fission of Pu^{240} by Fast Neutrons (Secheniye deleniya Pu^{240} bystrymi neytronami)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 2(8), pp 532-533 (USSR)

ABSTRACT: This paper measures the cross section of the fission of Pu^{240} with respect to the cross section of the fission of Pu^{239} by means of a double ionization chamber. Layers of Pu^{240} (2,5 mg) and Pu^{239} (4 mg) with a diameter of 5 cm were fastened to a common hightension electrode, and therefore they were located in the same neutron flow. The collecting electrodes had the shape of hemispheres with a diameter of 14 cm. This apparatus permitted exact separation of the fission fragments from the α-particles. The authors give the numerical values for the admixtures contained in the layers of Pu^{239} and Pu^{240}. The fast neutrons with energies lower

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than 2 MeV were produced by the reaction $T(p,n)He^3$, the neutrons with energies from 2 to 4 MeV by the reaction $D(d,n)He^3$, and 15 MeV neutrons - by the reaction $T(d,n)He^4$. The first reaction was accomplished by means of a Van de Graafe generator, the two others - by means of a cascade generator. The fissions in both halves of the chamber were counted for fast and also for thermal neutrons. The thermal neutrons were obtained by slowing down fast neutrons in a paraffin slug.

The cross section of the fission of Pu^{240} was used for the determination of the absolute value of the fission cross section of Pu^{240}. This cross section (in the plateau) amounts to $1,50 \pm 0,15$ barn and agrees with the results obtained by Dorofeyev and Dobrynin. For 15 MeV neutrons the fission cross section of Pu^{240} amounts to $2,6 \pm 0,2$ barn. The authors thank Professor A. I. Leypunskiy and I. I. Bondarenko for their interest in this paper and for useful comments. There are 1 figure and 2 references, 2 of which are Soviet.

SUBMITTED: May 10, 1958

SMIRENKIN, G.N., Cand Phys Math Sci -- (diss) "Relation of the number and spectrum of instantaneous neutrons to the energy of neutrons causing fission." M, 1959, 22 pp. 100 copies. Bibliography: pp 21-22 (49 titles) (KL, 28-59, 123)

21(0) PHASE I BOOK EXPLOITATION SOV/2081

International Conference on the Peaceful Uses of Atomic Energy, 2d., Geneva, 1958

Doklady sovetskikh uchenykh; yadernaya fizika (Reports of Soviet Scientists; Nuclear Physics) Moscow, Atomizdat, 1959. 552 p. (Series: Its: Trudy, Vol. 1) 8,000 copies printed.

Eds. (Title page): A.I. Alikhanov, Academician; V.I. Veksler, Academician; and N.A. Vlasov, Candidate of Physical and Mathematical Sciences; Ed. of this volume: S.I. Drozdov and B.P. Karetskiy, Candidates of Physical and Mathematical Sciences; Ed. (Inside book): G.L. Smolyan; Tech. Ed.: Ye.I. Mazel'.

PURPOSE: This collection of articles is intended for scientific research workers and other persons interested in nuclear physics. The volume contains 43 papers presented by Soviet Scientists at the Second Conference on Peaceful Uses of Atomic Energy, held in Geneva in September 1958.

COVERAGE: It is divided into two parts. Part I contains 17 papers dealing with plasma physics and controlled thermonuclear Reactions, and Part II contains 26 papers on nuclear physics, including problems of particle acceleration and of cosmic ray physics. The first paper by L.A. Artsimovich presents a review of Soviet work on controlled thermonuclear reactions. The remaining papers in Part I deal with particular problems in this field. papers in Part II deal in detail with various problems in nuclear physics, such as the fission of heavy atoms and their isotopes, and with the study of cosmic radiation by means of artificial earth satellites and rockets, described in a paper by S.N. Vernov. The Russian-language edition of the proceedings of the conference is published in 16 volumes. The first 6 volumes contain all the papers presented by Soviet scientists as follows: Volume (1), Yadernaya fizika (Nuclear Physics); Volume (2), Yadernyye reaktory i yadernaya energetika (Nuclear Reactor and Nuclear Power); Volume (3), Yadernoye goryucheye metally (Nuclear Fuel and Reactor Metals), Volume (4), Khimiya radioelementov i radiatsionnykh prevrashcheniy (Chemistry of Radioelements and of Radiation Transformations); Volume 5, Radiobiologiya i radiatsionnaya meditsina (Radiobiology and Radiation Medicine); Volume (6) Polucheniye i primeneniye izotopov (Production and Use of Isotopes). The other 10 volumes contain selected papers presented at the Conference by non-Soviet scientists. In the present volume discrepancies between the English and Russian language edition of the proceedings have been noted in three articles where the texts are not identical; vis; Andrianov, et al, "High Current Pulsed Discharge"; Akhiyezer, et al, "High Frequency Plasma Oscillation"; and Bogolyubov, "Investigations of the Many-body Problem". The serial numbers of reports 2302 and 2504 are reversed in the English edition. Report 2211, by Sinelnikov, et al, is numbered 2536 in the English edition.

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Reports of Soviet Scientists; Nuclear (Cont.) SOV/2081

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11

SMIRENKIN, G.N.

21(4) PHASE I BOOK EXPLOITATION SOV/2583

International Conference on the Peaceful Uses of Atomic Engergy. 2nd, Geneva, 1958.

Doklady sovetskikh uchenykh; yadernyye reaktory i yadernaya energetika. (Reports of Soviet Scientists; Nuclear Reactors and Nuclear Power) Moscow, Atomizdat, 1959. 707 p. (Series: Its: Trudy, vol. 2) Errata slip inserted. 8,000 copies printed.

General Eds.: N.A. Dollezhal, Corresponding Member, USSR Academy of Sciences, A.K. Krasin, Doctor of Physical and Mathematical Sciences, A.I. Leypunskiy, Member, Ukrainian SSR Academy of Sciences, I.I. Novikov, Corresponding Member, USSR Academy of Sciences, and V.S. Fursov, Doctor of Physical and Mathematical Sciences; Ed.: A.F. Alyab'yev; Tech. Ed.: Ye. I. Mazel'.

PURPOSE: This book is intended for scientists and engineers engaged in reactor designing, as well as for professors and students of higher technical schools where reactor design is taught.

COVERAGE: This is the second volume of a six-volume collection on the peaceful use of atomic energy. The six volumes contain the reports presented by Soviet scientists at the Second International Conference on Peaceful Uses of Atomic Energy, held from September 1 to 13, 1958 in Geneva. Volume 2 consists of three parts. The first is devoted to atomic power plants under construction in the Soviet Union; the second to experimental and research reactors, the experiments carried out on them, and the work to improve them; and the third, which is predominantly theoretical, to problems of nuclear reactor physics and construction engineering. Yu. I. Koryakin is the science editor of this volume. See SOV/2081 for titles of all volumes of the set. References appear at the end of the articles.

PART II. EXPERIMENTAL AND RESEARCH REACTORS

PART III. PHYSICS AND ENGINEERING OF REACTOR DESIGN

APPROVED FOR RELEASE: 08/25/2000 CIA-RDP86-00513R001651510007-5"

24.6000, 24.6200, 24.6520,
24.6800, 24.6720

77008
SOV/56-37-6-48/55

AUTHOR: Smirenkin, G. N.

TITLE: Letter to the Editor. Comparision of Effective Temperatures in Neutron Spectra of U^{235} and Pu^{239} Fission Produced by Fast and Thermal Neutrons

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1959, Vol 37, Nr 6, pp 1822-1824 (USSR)

ABSTRACT: The spectral shape of instantaneous neutrons as the energy function of the excitation from nuclear fission at energy above ~2 mev is defined by the effective temperature, T_{eff}. An analysis has shown (cf., I. I. Bondarenko, B. D. Kuz'minov, I. S. Kutsaeva, L. I. Prokhorova, G. N. Smirenkin, Report No. 2187, Geneva Conferences on the Peaceful Uses of Atomic Energy, 1958) that an increase in the energy of neutrons (E_n) by 1 mev should result in an increase in T_{eff} by 1.5-2%. The ratio

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77008
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Letter to the Editor. Comparison of Effective Temperatures in Neutron Spectra of U^{235} and Pu^{239} Fission Produced by Fast and Thermal Neutrons

second value provides the number of fissions in the sphere. Experimental ratios, ρ, were 1.95 $\pm$ 0.05 and 1.82 $\pm$ 0.05 for U^{235} and Pu^{239}, respectively. After applying the correction due to the increase in the absolute yield of neutrons, the following ratio were obtained for U^{235} and Pu^{239}, respectively: $dT_{eff}/dE_n = 0.008 \pm 0.004$ and $dT_{eff}/dE_n = 0.01 \pm 0.004$. The amount of the indicated error was due to the inaccuracy in the assumption regarding the nature of fission induced by fast and slow neutrons. These results are 1.5 - 2 times smaller than the theoretically predicted values (cf., I. I. Bondarenko, et. al., loc. cit). This work was carried out under the guidance of A. I. Leypunskiy and I. I. Bondarenko;

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Letter to the Editor. Comparison of Effective Temperatures in Neutron Spectra of U^{235} and Pu^{239} Fission Produced by Fast and Thermal Neutrons

77008
SOV/56-37-6-48/55

Sh. S. Nikolayshvili, V. S. Stavinskiy participated in the discussion of the subject, M.K. Golubeva and N. E. Tokmantseva participated in the experimental work. There are 7 references, 4 Soviet, 1 Dutch, 2 U.S. The U.S. references are: R. B. Leachman, Second Un. Nat. Intern. Conf. On the Peaceful Uses of Atomic Energy, U.S.A., 1958, p/665; J. S. Levin, L. Cranberg, Conf. on Neutron Physics By Time-of-Flight, Tennessee, ORNL-2309, 1956.

SUBMITTED: August 6, 1959

Card 4/4

S/089/60/009/01/03/011
B014/B070 82281

24.6600

AUTHORS: Nesterov, V. G., Smirenkin, G. N.

TITLE: Fission Cross Section of Pu^{240} for Neutrons of the Energy Range 0.04 to 4.0 Mev

PERIODICAL: Atomnaya energiya, 1960, Vol. 9, No. 1, pp. 16 - 20

TEXT: A layer of 4 mg of Pu^{239} containing 1.80 ± 0.05% of Pu^{240} (thickness ~0.2 mg/cm^2) is built in a double fission chamber, and is irradiated with monochromatic neutrons. The T (p,n) He^3 reaction is used as the neutron source for which protons are accelerated by a 5-Mev van de Graaff accelerator. The fission chamber was filled with 93% of argon and 7% of carbon dioxide. The pressure in the chamber was 120 torr. A broad-band amplifier connected the fission chamber and the counter. The ratio between the fission cross sections of Pu^{239} and Pu^{240} was measured as a function of neutron energy, and the fission cross section of Pu^{240} was determined from it analytically. The results are represented graphically (Figs. 3 and 4). The average cross section for E_n = 1 to 4 Mev

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SMIRENKIN, G. N., STAVISSKIY, Y.Y., SALNIKOV, O. A., UKRAINTSEV, F. I., USACHEV, L. N., LEYPUNSKIY, A. I., KAZACHKOVSKIY, O. D., ABRAMOV, A. I., ALEKSANDROV, Y. A., ARISTARKHOV, N. N., BONDARENKO, I. I., KRASNOYAROV, N.V., MOROZOV, V. N., NIKOLAYEV, N. N., PINKHASIK, M. S.,

Physical charactistics of the BR-5 reactor
report submitted for the Iaea Seminar on the Physics of Fast and Intermediate Reactors, Vienna, 3-11 August 1961
(report presented by G. I. Marchuk)

Acad. Sci. USSR, Moscow

S/120/61/000/002/004/042
E032/E114

26.2242

AUTHORS: Dulin, V.A., Kazanskiy, Yu.A., Kuznetsov, V.F., and Smirenkin, G.N.

TITLE: A single-crystal, fast neutron scintillation spectrometer with discrimination against gamma-rays

PERIODICAL: Pribory i tekhnika eksperimenta, 1961, No.2, pp.35-41

TEXT: The transformation of the amplitude distribution due to recoil protons into the neutron energy spectrum in the case of a small crystal (negligible multiple neutron scattering) for which the light output depends linearly on the proton energy, can easily be carried out by differentiating the experimental spectrum. In fact, in the case of stilbene which was used by the present authors the relation is not linear and small crystals cannot be used if an adequate counting efficiency is to be obtained. The light output due to recoil protons and the form of the amplitude distribution due to monoenergetic neutrons was investigated using a Van de Graaf generator and the $T(p,n)He^3$, $D(d,n)He^3$ and $T(d,n)He^4$ reactions. Neutron energies in the following ranges could thus be obtained: 0.3-3.5, 4-7.5 and

A single-crystal, fast neutron scintillation spectrometer with discrimination against gamma-rays

17-22 Mev respectively. The amplitude distributions due to recoil protons for 4.3 and 16.8 Mev neutrons are shown in Fig.1. The recoil-proton energy distribution P(E) can be obtained from the amplitude distribution $\Phi(V)$ with the aid of the following relation:

$$\Phi(V)dV = P(E)dE,$$

$$P(E) = \Phi[V(E)] \frac{dV}{dE} = F(E) \frac{dV}{dE} \qquad (1)$$

The functions V(E) and dV(E)/dE which are necessary to compute the neutron spectra are shown in Fig.2. The experimental values of V(E) are well represented by the Birks theory (Ref.1) according to which

$$V(E) = \int_0^E \frac{dV}{dE'} dE' = \text{const} \int_0^E \frac{dE'}{1 + kB \cdot dE'/dx} \qquad (3)$$

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S/120/61/000/002/004/042
E032/E114

A single-crystal, fast neutron scintillation spectrometer with discrimination against gamma-rays

If dE'/dx is expressed in Mev/cm of the range in air then kB turns out to be 20 cm/Mev. Fig.3 shows the recoil proton spectra for 1.0, 1.8 and 3.6 Mev neutrons. These curves were obtained with a cylindrical stilbene crystal (30 mm diameter, 15 mm long). The curves have a hump at the high energy end which is due to multiple neutron scattering. The latter effect is small for neutron energies greater than about 2 Mev. It can therefore be neglected at the higher energies. Fig.4 shows the energy dependence of the resolution of the single-crystal spectrometer. The resolution in the energy range 1-22 Mev can be described by the formula:

$$\Delta E_n/E_n = 20/\sqrt{E_n}\ \%$$

The efficiency of the spectrometer η can be described by:

$$\eta(E_n) = \frac{1 - \exp\left[-\sum(E_n)d\right]}{E_n}\ \Delta E \qquad (4)$$

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21394
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E032/E114

A single-crystal, fast neutron scintillation spectrometer with discrimination against gamma-rays

where ΔE is the differentiation step for the recoil proton distribution. The efficiency for the above stilbene crystal was found to be about 3% at 2 Mev and about 0.5% at 10 Mev (the differentiation step was taken to be equal to the energy resolution ΔE_n). The discrimination against gamma rays is based on the differences in the effective scintillation decay constant for neutrons and gamma rays. The present authors have used the scheme suggested by Birks and described in detail by F.D. Brooks in Nucl. Instrum. and Methods, 1959, 4, 151 (Ref.5). Fig.13 shows neutron spectra for a Po-Be source (curve 1 - present results, curves 2 and 3 due to B.G. Whitmore and W.B. Backer (Ref.7: Phys.Rev., 1950, 78, 799) and J.O. Elliot and W.I. McGarry and W.R. Faust (Phys.Rev., 1954, 93, 1348, Ref.8). It is stated that the overall efficiency for neutrons having an energy of 2 Mev has been increased to about 10%. The gamma ray efficiency is lower by a factor of 100. Acknowledgements are expressed to L.D. Gordeyev, Yu.I. Baranov, V.I. Bol'shov and

Card 4/7

Yu.V. Pankrat'yev for assistance in this work.
There are 14 figures and 9 references: 2 Soviet and 7 English.
SUBMITTED: June 26 1960

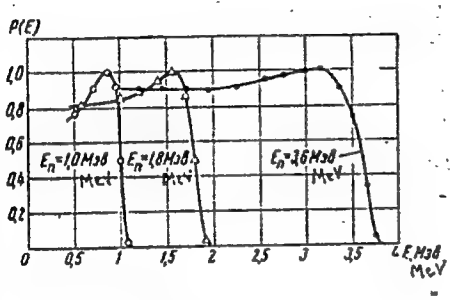

Fig. 3

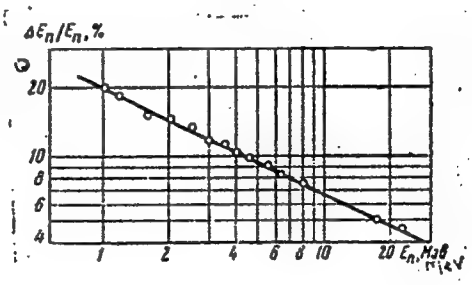

Fig. 4

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NESTEROV, V.G.; SMIRENKIN, G.N.; BONDARENKO, I.I.

Anisotropy of the fission fragments of Pu^{240} and Pu^{239} nuclei.
Atom.energ. 10 no.6:620-622 Je '61. (MIRA 14:6)
(Plutonium--Isotopes) (Nuclear fission)

NESTEROV, V.G.; SMIRENKIN, G.N.; BONDARENKO, I.I.

Angular anisotropy of the fission of even-even nuclei. Atom. energ. 11 no.3:248-250 S '61. (MIRA 14:9)

(Nuclear fission)

SMIRENKIN, G.N.

13

21406
S/089/61/011/006/002/014
B102/B138

21.1000

AUTHORS: Leypunskiy, A. I., Abramov, A. I., Aleksandrov, Yu. A., Anikin, G. V., Bondarenko, I. I., Guseynov, A. G., Ivanov, V. I., Kazachkovskiy, O. D., Kuznetsov, V. F., Kuz'minov, B. D., Morozov, V. N., Nikolayev, M. N., Sal'nikov, O. A., Smirenkin, G. N., Soldatov, A. S., Usachev, L. N., Yutkin, M. G.

TITLE: Investigation of the BR-5 (BR-5) fast reactor (spatial and energy distributions of neutrons)

PERIODICAL: Atomnaya energiya, v. 11, no. 6, 1961, 498 - 505

TEXT: The fast research reactor BR-5 and its experimental equipment is described in brief and some of its neutron spectra are given and discussed. The following data are given: fuel - plutonium oxide; coolant - sodium; reflector - thin layer of natural uranium plus thick layer of nickel; power - 5000 kw. The reactor has many vertical and horizontal holes for technical and physical studies and is well supplied with experimental equipment. Leypunskiy gave a detailed description of the BR-5 reactor at

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Investigation of the...

the Second Geneva Conference (1958). Inside the core the neutrons have energies of more than 100 kev which they lose almost completely in passage through reflector and shield. In the outer layers of the shield, their mean energy does not exceed some tens of ev. In the kev range (E_n>50 kev) spectra were measured for the most important beams and channels. For the other cases, they were determined from threshold reactions. The soft part of the spectrum within the reflector was determined from the spatial distribution of neutrons with $E_n \simeq 5$ ev, recorded with gold resonance indicators. The total neutron flux was determined only at the points where the Pu^{239} fission cross section was constant. Direct neutron spectrum measurements were carried out in a vertical (OK-70) and a horizontal (B-3) channel using (He^3+Ar)-filled ionization chamber in the first case and the neutron transmission method with n-hexane in the second. The neutron spectrum of the horizontal channel was also determined by photoemulsions. From the rates of indicator and fission reactions $Au^{197}(n,\gamma)$, $U^{235}(n,f)$ $Pu^{239}(n,f)$, $Th^{232}(n,f)$, $Na^{23}(n,\gamma)$ $Cu^{63}(n,\gamma)$, and $Al^{27}(n,\alpha)$ the abrupt

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21409
S/089/61/011/006/005/014
B102/B138

21.6000

AUTHORS: Golubev, V. I., Ivanov, V. I., Nikolayev, M. N., Smirenkin, G. N.

TITLE: Use of resonance indicators for investigating neutron spectra in fast reactors

PERIODICAL: Atomnaya energiya, v. 11, no. 6, 1961, 522 - 527

TEXT: The authors studied the possibilities of using resonance indicators for investigating the low-energy part of neutron spectra in the reflectors of fast reactors. The resonance blocking method is discussed in detail. In this case, the indicator foil is covered on both sides by thin shielding layers, except in the vicinity of resonance at $E = E_0$.

Resonance neutron flux can be calculated by measuring the activity difference

$$\Delta A = \varphi(E_0)\frac{\pi}{2}\Gamma_\gamma\Sigma_{0,a}\eta + 2t\int\Sigma_a(E)\Sigma_e(E)\left\{1-\frac{1}{2}\times E_1[-\Sigma_e(E)t]\right\}\varphi(E)\,dE. \quad (1)$$

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Use of resonance indicators...

is found. This relation is used for calculating the blocking factors (cf. Table 1). I_o and I_1 are zeroth and first-order Bessel functions of an imaginary argument. Good indicators will show a broad energy gap between first and second resonance activation cross sections. Table 2 gives the characteristic parameters of several isotopes which are recommended as indicators. Only for In^{115}, Au^{197} (broad resonance) and La^{139} (narrow resonance), the relation $\Sigma_o' = \begin{cases} \Sigma_o \text{ for } \Gamma \ll \xi E_o \text{ (narrow resonance)} \\ \Sigma_o \frac{\Gamma_\gamma}{\Gamma} \text{ for } \Gamma \gg \xi E_o \text{ and } \Gamma \approx \Gamma_\gamma \text{ (broad resonance)} \end{cases}$ holds; for the others, Σ_o' has to be determined experimentally. If the contributions of higher resonances to the neutron spectrum are negligible, the activity induced by first-resonance neutrons may be determined by the so-called "1/v law". This method is demonstrated for two isotopes, the first of which has resonance at $E = E_o$, the second one obeys the 1/v law ($B^{10}(n,\alpha)$). The neutron flux is determined from

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32009
S/089/62/012/001/012/019
B102/B138

21.5210

AUTHORS: Galkov, V. I., Ivanov, V. I., Smirenkin, G. N., Smirnov-Averin, A. P.

TITLE: Investigation of the uranium rod assembly of the BP-5 (BR-5) reactor

PERIODICAL: Atomnaya energiya, v. 12, no. 1, 1962, 56-57

TEXT: Some characteristics and parameters of a uranium-rod assembly exposed to a $5 \cdot 10^{21}$ neutron flux in a BR-5 reactor have been determined. The BR-5 reactor uses plutonium as fuel and uranium as reflecting material; the reflector consists of 3 cm natural uranium + 30 cm nickel. The middle of the assembly studied was 12.6 cm off the reactor center. The distributions of the absolute number of fission events in the uranium and of the capture events in U^{238} were determined for the length of the assembly (28 cm), the first from the absolute activity of Cs^{137}, and the second from the Pu-concentration in the uranium, i.e. its specific α activity. From the Pu separated from the assembly, the Pu^{240} content

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3939

S/089/62/012/006/001/019
B102/B104

24.6600

AUTHORS: Okolovich, V. N., Smirenkin, G. N., Bondarenko, I. I.

TITLE: Precise comparison of the average kinetic energies of fragments from U^{235} fission induced by thermal neutrons and neutrons with an average energy of 5 Mev

PERIODICAL: Atomnaya energiya, v. 12, no. 6, 1962, 461-466

TEXT: The dependence of the U^{235} fragment energy on the excitation energy of the fissionable nucleus was studied as no unambiguous results were available. Measurements of great exactitude were made using an ionization chamber with a grid and a double ionization chamber (spectrometer part plus control part). The pulse-height spectrum of the fission fragments in the spectrometer part was recorded by a 128-channel analyzer. 35 and 70 $\mu g/cm^2$ thick U^{235} layers (concentration 92.5%) on metal base and collodion film were used. Neutrons of 5 Mev energy were obtained from $D(d,n)He^3$ reactions (E_d = 2.5 Mev). 10-15 fragment spectra were recorded in each of the three series of measurements, and 5,000-10,000 pulses were measured for each spectrum. The third series was carried out in four

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S/089/62/012/006/001/019
B102/B104

Precise comparison of the ...

subseries with bombardment either perpendicular or parallel to the layer. The spectra of the fission fragments were recorded in the hemisphere in front of or behind the layer. The ratio ϱ between the kinetic energies of fragments released by fast and thermal neutrons was obtained from the measured value of $\tilde{\varrho}$, taking account of all important corrections: $\tilde{\varrho} = \tilde{\varrho} + \Delta\varrho_h + \Delta\varrho_I + \Delta\varrho_\nu + \Delta\varrho_c$. The correction terms allow for the losses in the layer, the ionization defect, neutron emission, and for the motion of the center of mass. The results are given numerically. The effect of the correction terms is insignificant and is only slightly above the error of measurement. While the control substantially improves the energy resolution, it hardly influences the values of ϱ, which deviate very little from unity. The kinetic energy of the fragments does not change when the excitation energy is increased to 5 Mev. The excess excitation energy is almost completely consumed by the increase in the fragments' kinetic energy. There are 2 figures and 1 table.

SUBMITTED: October 21, 1961

Card 2/2

38990
S/089/62/013/001/006/012
B102/B104

21.2110

AUTHORS: Okolovich, V. N., Smirenkin, G. N.

TITLE: Comparison of the mean kinetic energies of U^{235} fission fragments from thermal neutrons and from neutrons having an average energy of 15 Mev

PERIODICAL: Atomnaya energiya, v. 13, no. 1, 1962, 64-65

TEXT: The authors have shown already (Atomnaya energiya, 12, no. 6, 461, 1962) that in the case of thermal and 5-Mev neutrons the mean kinetic energies of the U^{235} fission fragments agree with an accuracy of 0.1 %. Similar experiments have now been made with thermal and 15-Mev neutrons, using an ionization chamber with a grid, this being filled with commercial argon plus 3 % CO_2 at 80 mm Hg. A 128-channel analyzer was used to determine the pulse-height spectrum. The fast neutrons were obtained from a tritium target bombarded by 2.2-Mev deuterons. Applying the necessary corrections to the measured ratios Q the true values $Q = E^{fast}_{kin}/E^{th}_{kin}$ were arrived at. It was found that E^{fast}_{kin} is smaller than E^{th}_{kin} by 1.5 ± 0.3 Mev,

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this result differing from that of Stevenson et al. (Phys. Rev. 117, 186, 1960). The reduction in E^{fast}_{kin} can be attributed to (n,n'f) and (n,n'2n'f) processes also induced by the 15-Mev neutrons and to a thermal expansion of the nucleus. There is 1 table.

SUBMITTED: December 27, 1961

Card 2/2

SMIRENKIN, G.N.; NESTEROV, V.G.; BONDARENKO, I.I.

Fission cross sections for U^{233}, U^{235}, and Pu^{239} in the energy range of 0.3-2.5 Mev. neutrons. Atom. energ. 13 no.4:366-368 O '62. (MIRA 15:9)
(Uranium—Isotopes) (Plutonium) (Nuclear fission)

43375

S/056/62/043/005/039/058
B125/B104

AUTHORS: Okolovich, V. N., Smirenkin, G. N.

TITLE: The kinetic energy of subbarrier fission fragments

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 5(11), 1962, 1861-1864

TEXT: Results of experiments are evaluated, in which the distributions of the kinetic energy were compared as between a spontaneous and an induced fission of compound nuclei of U^{238} and P^{240}. According to V. N. Okolovich et al. (Atomnaya energiya, 12, 461, 1962) the kinetic energies of fragments in a fission caused by thermal neutrons differ by only 0.1% from those in a fission caused by neutrons of a mean energy of 5 Mev. Experimental values for the dependence of the average number of the prompt fission neutrons emitted in the fission on the type of nucleus are substantially greater for nuclei with $Z < 94$ than the values found by extrapolation based on the Fowler hypothesis. According to experiments conducted by B. D. Kuz'minov et al. (ZhETF, 37, 406, 1959) and other authors the explanation is that in induced fissions the mean kinetic energy of the fission fragments is greater by ΔE_k than in spontaneous fissions. The present authors proved this

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The kinetic energy of subbarrier fission...

difference more accurately than was done in pertinent previous studies, by also comparing the mean kinetic energy for the photofission of U^{238} and the fission of U^{238} by thermal neutrons, and further by utilizing additional data on the mean number of secondary neutrons emitted per fission. If in subbarrier and superbarrier fission ΔE_k is only associated with the change of the kinetic energy of the relative movement before the instant of stripping, ΔE_k would have to increase with Z^2/A increasing. Treatment of the experimental results shows that the opposite is true. The defects of the model are discussed and it is shown that the classification of $E_k = 0.121 \cdot Z^2 A^{-1/3}$ Mev by J. Tenrell (Phys. Rev., 113, 527, 1959) can be determined more accurately by a separate investigation of the data on the spontaneous and induced fission. There are 1 figure and 1 table.

SUBMITTED: June 6, 1962

L 10673-63
EPF(n)-2/EWT(m)/BDS--AFFTC/ASD/SSD--Pu-4

ACCESSION NR: AP3002257 S/0089/63/014/006/0530/0534

60

AUTHOR: Gordeyeva, L. D.; Smirenkin, G. N.

TITLE: An empirical formula for the average number of fission neutrons 19

SOURCE: Atomnaya energiya, v. 14, no. 6, 1963, 530-534

TOPIC TAGS: fission neutrons, U sup 233, U sup 235, Th sup 2291, Pu sup 239, Pu sup 241, Am sup 241

ABSTRACT: The possibility is shown of expressing the data concerning the average number of instantaneous neutrons (ANN) emitted during fissions, by a linear relationship between the charge and mass number of the atom undergoing fission. An empirical formula is obtained for the fission of six nuclei (Th sup 229, U sup 233, U sup 235, Pu sup 239, Pu sup 241, Am sup 241) bombarded by thermal neutrons. The formula is then generalized for nuclei with any even number of nucleons by introducing an even-odd factor. The formula permits the prediction of the ANN in a forced fission for the practically important nuclei: Z equal or greater than 90, N = A-Z equal or less than 152. "The authors express their gratitude to I. I. Bondarenko and L. N. Usachev for valuable suggestions and comments." Orig. art. has: 2 figures, 2 tables, and 4 equations.

Card 1/2

L 14932-63 EPF(n)-2/EWT(m)/BDS AFFTC/ASD/SSD Pu-4 DM
ACCESSION NR: AP3003980 S/0089/63/015/001/0064/0066 69 63

AUTHORS: Blyumkina, Yu. A.; Bondarenko, I. I.; Kuznetsov, V. F.; Nesterov, V. G.; Okolovich, V. N.; Smirenkin, G. N. 19

TITLE: Number of prompt neutrons and kinetic energy of fragments in low-energy fission of U sup 235

SOURCE: Atomnaya energiya, v. 15, no. 1, 1963, 64-66

TOPIC TAGS: prompt neutron, U sup 235, kinetic energy of fission fragment, Fowler hypothesis

ABSTRACT: According to Fowler's hypothesis, the kinetic energy of the fission fragment does not depend on the excitation energy of the splitting atom, from which it follows that the average number of prompt neutrons (a.n.p.n.) is increasing linearly with the increase of the energy E_n of neutrons producing fission. For large E_n, this approximately valid, but may not be correct for low E_n. The present work was conducted in order to investigate the lower E_n range in greater detail. The data sought are important practically, and may help to clarify the nature of the fission channels and the mechanism which produces the distribution of the observed energy. U_{235} was used as target; the reaction T(p, Alpha) was pro-

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L 14932-63
ACCESSION NR: AP3003980

6

duced with an electrostatic generator. The correlation between E_n and a.n.p.n. is presented in three figures. The results are discussed. "The authors express their deep appreciation to A. I. Leypunskiy for attention and constant interest to work, to L. N. Usachev and V. N. Andreyev for fruitful discussion of experimental results, and gratitude to V. I. Bol'shov, L. D. Gordeyeva, and L. I. Prokhorova for help with the work and participation in various stages of measurements." Orig. art. has: 3 figures.

ASSOCIATION: none

SUBMITTED: 04Aug62 DATE ACQ: 08Aug63 ENCL: 00

SUB CODE: PH NO REF SOV: 003 OTHER: 007

Card 2/2

OKOLOVICH, V.N.; SMIRENKIN, G.N.

Channeling effects in the energy dependence of the mean kinetic energy of U^{233} fission fragments. Atom. energ. 15 no.3:250-253 S '63. (MIRA 16:10)

(Uranium isotopes) (Nuclear fission)

OKOLOVICH, V.N.; BOL'SHOV, V.I.; GORDEYEVA, L.D.; SMIRENKIN, G.N.

Dependence of the mean kinetic energy of fragments on the mass of the fissionable atom. Atom. energ. 15 no.5:419-420 N '63.(MIRA 16:12)

D'YACHENKO, P.P.; KUZ'MINOV, B.D.; KUTSAYEVA, L.S.; OKOLOVICH, V.N.; SMIRENKIN, G.N.; UTYUZHNIKOV, A.N.

Kinetic energy of fragments produced in the symmetrical fission of U^{235}. Zhur. eksp. i teor. fiz. 45 no.2:8-12 Ag '63. (MIRA 16:9)

(Uranium isotopes) (Nuclear fission)

L 9105-65
ACCESSION NR: AT4048278

ularities in the energy dependences of the fission characteristics. The angular distribution of the cross section $\sigma_f(\theta)$ of the fission of U^{233}, U^{235}, and Pu^{239} by neutrons with energies between 0.08 and 1.25 MeV was measured by a procedure described elsewhere (V. G. Nesterov et al., Atomnaya energiya 16, no. 6, 1964). The data obtained on $\sigma_f(\theta)$ confirm the earlier results of the authors (V. G. Nesterov et al., Atomnaya energiya 10, 620, 1961 and 11, 248, 1961) and show that the correlated increases and decreases in the asymmetry $\sigma_f(0°)/\sigma_f(90°)$ correspond to abrupt changes in the angular distributions of the fission fragments. The various irregularities in the angular distributions at different fissioning-neutron energies are interpreted as being connected with the opening up of new fission channels. In particular, the change in the character of $\sigma_f(\theta)$ when U^{235} is fissioned by neutrons with $E_n \lesssim 0.3$ MeV is due to the opening up of fission channels with $k = 2$ (k -- projection of total angular momentum of the compound nucleus on the fission axis). It is also shown that, in contrast to earlier notions, new

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L 9106-65

ACCESSION NR: AT4048278

fission channels can open up at energies up to the excitation energy at the saddle point (E* = 2.5 MeV), where the energy gap of even-even nuclei is noticeable larger (~2.7 MeV) than in the equilibrium state. The presence of an energy gap in the level spectrum of the transition nucleus U^{236} can likewise explain the observed decrease in the number of secondary fission neutrons near 2.2 MeV. Other experimental data are interpreted in light of these results. Orig. art. has: 3 figures.

ASSOCIATION: None

SUBMITTED: 00 ENCL: 00

SUB CODE: NP NR REF SOV: 004 OTHER: 007

Card 3/3

SMIRENKIN, G. N.; NESTEROV, ~~B.~~ G.; BONDARENKO, I. I.

"Fission neutron cross sections U-233, U-235, and PU-239 in the interval of neutron energy 0,3 -2,5 MEV and PU-240 in the interval of neutron energy 0,04 - 4,0 MEV."

report submitted for IAEA Intl Nuclear Data Sci Working Group Mtg, Vienna, 9-13 Nov 64.

BONDARENKO, I. I.; KUZNETSOV, V. F.; NESTEROV, V. G.; PAVLINCHUK, V. A.; PROKHOROVA, L. I.; RABOTNOV, N. S.; SMIRENKIN, G. N.; USACHEV, L. N., Obninsk

"Effects of energy gap in channel spectrum on the fission process."

report submitted for Intl Conf on Low & Medium Energies Nuclear Physics, Paris, 2-8 Jul 64.

ACCESSION NR: AP4041447 S/0089/64/016/006/0497/0500

AUTHORS: Ivanov, V. I.; Krot, N. N.; Smirenkin, G. N.

TITLE: Distribution of the ratio of the radiative-capture and fission cross sections for Pu-239 over the height of the BR-5 reactor

SOURCE: Atomnaya energiya, v. 16, no. 6, 1964, 497-500

TOPIC TAGS: neutron capture, capture cross section, fission cross section, breeder reactor, neutron flux neutron spectrum

ABSTRACT: This research was undertaken because of the interest that attaches to a knowledge of the cross-section ratio for the determination of the breeding ratio, for the choice and averaging of the microscopic constants, and for reactor design in general. The distribution of the neutron-capture reactions was measured by determining the Pu^{240} concentration from the rate of spontaneous fis-

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ACCESSION NR: AP4041447

sion in plutonium samples irradiated in a reactor with integral flux 10^{21}--10^{22} neut/cm^2. The initial material for the irradiation was Pu^{239} of almost isotopic purity (containing $\approx 5 \times 10^{-3}$% Pu^{240}). The distribution of the Pu^{239} fission in the reactor was measured by two methods -- with the aid of a fission chamber and by determining the activity of the fission products from the irradiated samples. The Pu^{239} capture cross section could be determined from the Pu^{240} concentration and the integral neutron flux. The values obtained for the ratio of the radiative capture to fission cross section (α) increase from 0.1 to 0.8 with increasing distance from the reactor center. Data corresponding to the equilibrium spectra of the neutrons in the active zone and in the outer region of the reflector agree with the measured capture and fission cross sections for monoenergetic neutrons. When group calculation is used, the values agree with the calculated ones only for the active zone, with noticeable discrepancies in the reflector. "This work was performed under the general guidance of I. I. Bondarenko and A. P.

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ACCESSION NR: AP4041447

Smirnov-Averin, to whom the authors are grateful. They also thank A. I. Leypunskiy and O. D. Kazachkovskiy for interest in the work, V. I. Galkov for participating in individual stages of the work, Yu. A. Blyumkina for preparing the electronic apparatus, and the hot-laboratory and reactor crew for help with the experiment."
Orig. art. has: 1 figure and 1 table.

ASSOCIATION: None

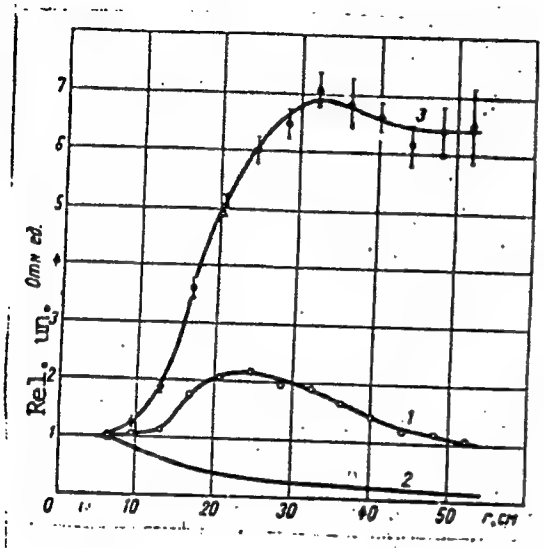
SUBMITTED: 18Apr63 ENCL: 02

SUB CODE: NP NR REF SOV: 008 OTHER: 005

Card 3/5

ACCESSION NR: AP4041447

ENCLOSURE: 01



Distribution of the neutron radiative capture (1), fissions, and $\alpha = \sigma_\gamma / \sigma_f$ for Pu^{239} (3) as functions of the distance from the center of the reactor.

The reaction rate and the value of for r = 4.7 cm atre taken as unity

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ACCESSION NR: AP4041447

ENCLOSURE: 02

Summary table of the obtained experimental data

Distance to cent. plane, cm	Distance to reactor cent. cm	Pu-240 content,%*	Relative number of captures	Relative number of fissions	Distribution, a	α
0	4,7	0,235±0,008	1,00	1,00	1,00	0,11 ±0,01
4	6,2	0,234±0,010	0,99±0,04	0,965±0,030	1,04±0,05	0,115±0,010
8	9,3	0,252±0,019	1,07±0,07	0,840±0,025	1,28±0,10	0,14±0,015
12	12,9	0,268±0,012	1,14±0,04	0,650±0,020	1,76±0,09	0,195±0,015
16	16,7	0,413±0,018	1,76±0,06	0,492±0,015	3,58±0,17	0,395±0,035
20	20,5	0,483±0,017	2,06±0,06	0,408±0,012	5,05±0,21	0,555±0,045
24	24,4	0,509±0,019	2,16±0,07	0,333±0,010	6,50±0,27	0,715±0,06
28	28,3	0,460±0,017	1,96±0,06	0,282±0,008	6,95±0,30	0,765±0,065
32	32,2	0,448±0,016	1,90±0,05	0,252±0,007	7,56±0,31	0,83±0,075
36	36,1	0,390±0,024	1,66±0,10	0,226±0,007	7,35±0,50	0,81±0,08
40	40,0	0,342±0,012	1,46±0,04	0,204±0,006	7,14±0,28	0,785±0,07
44	[illegible],0	0,284±0,015	1,21±0,06	0,182±0,005	6,65±0,38	0,73±0,07
48	48,0	0,275±0,018	1,17±0,07	0,170±0,005	6,90±0,47	0,765±0,08
52	52,0	0,250±0,026	1,06±0,11	0,152±0,005	7,00±0,75	0,77±0,10

*After subtracting the Pu-240 concentration in the initial material and with allowance for the Pu-239 burnup due to fission

Card 5/5

NESTEROV, V.G.; BLYUMKINA, Yu.A.; KAMAYEVA, L.A.; SMIRENKIN, G.N.

Angular distribution of fragments in U^{235} and Pu^{239} fission by 0.08 to 1.25 Mev. neutrons. Atom. energ. 16 no.6:519-521 Je '64. (MIRA 17:7)

OKOLOVICH, V.N.; SHIRENKIN, G.N.

Mean kinetic energy of fragments in above-threshold fission (n, nf). Atom. energ. 16 no.6:521-523 Je '64. (MIRA 17:7)

ACCESSION NR: AP4042257 S/0089/64/017/001/0028/0034

AUTHORS: Bol'shov, V. I.; Prokhorova, L. I.; Okolovich, V. N.; Smirenkin, G. N.

TITLE: Some data on the spontaneous fission of Cm^{244}

SOURCE: Atomnaya energiya, v. 17, no. 1, 1964, 28-34

TOPIC TAGS: curium, nuclear fission, fission product, prompt neutron, spontaneous fission, fission cross section

ABSTRACT: In view of surprising violations of the smooth variation, in the case of transplutonium nuclei, of the average kinetic energy of the fragments and of the average number of prompt neutrons per fission event from isotope to isotope, the authors have undertaken to obtain more precise data for the spontaneous fission of Cm^{244} and to analyze the causes of this phenomenon. The average kinetic energy of the fission fragments for spontaneous fission of Cm^{244} was found

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ACCESSION NR: AP4042257

to be 182.3 ± 2.3 MeV, with a half-width of the distribution 24.8 ± ± 2.5 MeV at half the height and an average number of 2.71 ± 0.4 prompt neutrons per fission event. The kinetic energy was measured by means of a double ionization chamber and comparison with the well established value of the kinetic energy of U^{235} fission by thermal neutrons. The procedure is described in detail. The number of prompt neutrons was determined by recording the coincidences between the pulses of a neutron detector, in which is placed an ionization fission chamber with the investigated substance. The results indicate that the average kinetic energy has low sensitivity to even large changes in the excitation energy and the angular momentum of the compound nucleus. The transcurium nuclei as a rule do not obey the linear variation of the kinetic energy with $Z^2/A^{1/3}$. Attention is called to the correlation between the anomalies in the dependence of E_K and ν on the nucleon composition of the fissioning nucleus and the variation of the most probable fragment masses. A hypothesis that the observed effects are connected with a change in the "elastic"

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ACCESSION NR: AP4042257

properties of the produced fragments is discussed. It is concluded that the individual properties of the produced fragments have a strong influence on the fission process. Although the concrete mechanisms whereby the shells affect different fission methods and their characteristics are unknown, a likely conclusion is that the direct influence of the nuclear shell structure on the dynamics of fission is one of the most important factors. "The authors are grateful to A. G. Kozlov, V. B. Pavlovich for preparation of the Cm^{244} compounds, Z. A. Aleksandrova for participation in individual stages of the work, and N. Ye Fedorova and Yu. M. Turchin for help with the measurements." Orig. art. has: 5 figures and 4 formulas.

ASSOCIATION: None

SUBMITTED: 23Oct63 ENCL: 01

SUB CODE: NP NR REF SOV: 008 OTHER: 017

Card 3/4

L 12987-65 EWT(m) DIAAP MLK S/0000/64/000/000/0001/0004

ACCESSION NR: AT4048287

AUTHORS: Smirenkin, G. N.; Nesterov, V. G.; Bondarenko, I. I. 19 B

TITLE: Fission cross sections of U-233, U-235, and Pu-239 in the neutron energy interval 0.3--2.5 MeV and of Pu-240 in the neutron energy interval 0.04--4.0 MeV

SOURCE: Secheniya deleniya U 233, U 235, Pu 239 v intervale energiy neytronov 0.3--2.5 MeV i pu 240 v intervale energiy neytronov 0.04--4.0 MeV *

TOPIC TAGS: nuclear fission, fission cross section, uranium, plutonium, fission neutron, neutron energy

ABSTRACT: The fission cross sections are listed in two tables: 1. For U^{233}, U^{235}, and Pu^{239} in the neutron energy interval 0.3--2.5 MeV. 2. For Pu^{240} in the interval 0.04--4.0 MeV. The reference for Table 1 is an article by all three authors in Atomnaya energiya

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L 12987-65
ACCESSION NR: AT4048287

v. 13, no. 4, 366, 1962, while that for Table 2 is an article by Nesterov and Smirenkin in the same journal, v. 11, no. 1, 16 (1960). Orig. art. has: 2 tables.

ASSOCIATION: None

SUBMITTED: 00 ENCL: 00

SUB CODE: NP NR REF SOV: 000 OTHER: 000

Card 2/2

L 2343-66 EWT(m)/EWA(h)

ACCESSION NR: AT5022126 UR/3158/65/000/001/0001/0007

33
24
B+1

AUTHORS: Soldatov, A. S.; Smirenkin, G. N.; Kapitsa, S. P.; Tsipenyuk, M. Yu.

TITLE: Fission of uranium-238 by quadrupole absorption of gamma-quanta

SOURCE: Obninsk. Fiziko-energeticheskiy institut. Doklady, no. 1, 1965. Deleniye urana-238 pri kvadrupol'nom pogloshchenii gamma-kvantov, 1-7

TOPIC TAGS: uranium, fission product, fission, gamma ray, bremsstrahlung

ABSTRACT: The angular distribution of fission fragments during the photofission of U^{238} under $F^{19}(p,\alpha,\gamma)O^{16}$ gamma-quanta reaction and electron bremsstrahlung radiation was measured. The apparatus used for measuring this angular distribution is given schematically in Fig. 1 on the Enclosure. The two U^{238} layers are of thickness 1 mg/cm^2. All the data were reduced, using mean square fit curves, and the angular distribution of the fragments was expressed by

$$W(\vartheta) = a + b\sin^2\vartheta + c\sin^2 2\vartheta.$$

The gamma-ray source was a thick CaF_2 crystal target irradiated by 1.45 Mev protons. The angular distribution results were plotted on a graph next to the data of B. Forkman and S. A. E. Johansson (Nucl. Phys. 20, 136, 1960). The present curve was

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found to lie consistently below the one given by Forkman and Johansson because of the large quadrupole component in the total fission cross section in the region of 6 to 7 Mev. The gamma-ray electron bremsstrahlung radiation experiments were done in the 12 Mev microtron at the Physical Problem Institute, AN SSSR. The target was a tungsten disk of 1 mm thickness behind which was placed the apparatus for angular distribution measurement. The results were plotted graphically as the ratios $a/_b$, $c/_b$ versus $E_m (5 \leq E_m \leq 10)$. The magnitude of $a/_b$ throughout these experiments lay systematically below similar data reported by other authors, probably because of a difference in target thickness. "The authors are deeply grateful to L. N. Usachev and N. S. Rabotnov for helping in the work, to P. L. Kapitsa for supporting the work, to V. P. Perelygin and S. P. Tret'yakova for acquainting us with the fission fragment recording technique, and to M. K. Golubeva, L. D. Gordeyeva and N. Ye. Federova for taking part in the tests." Orig. art. has: 4 figures and 1 equation.

ASSOCIATION: Fiziko-energeticheskiy institut, Obninsk (Physico-Power Institute, Obninsk); Institut fizicheskikh problem, AN SSSR (Institute of Physical Problems, AN SSSR)

SUBMITTED: 00 ENCL: 01 SUB CODE: NP
NO REF SOV: 006 OTHER: 008

L 2343-66
ACCESSION NR: AT5022126

ENCLOSURE: 01

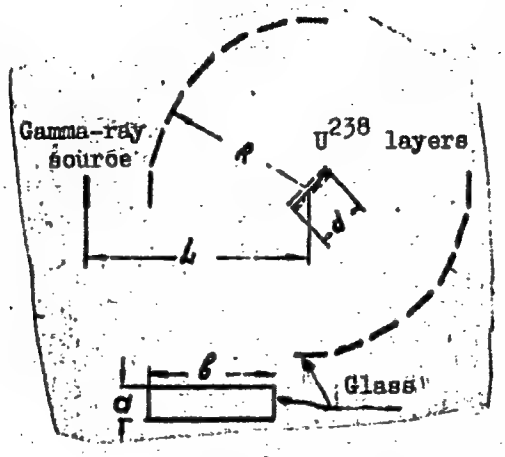

Fig. 1.

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L 1954-66 EWT(m)/EWA(h)
ACCESSION NR: AT5024113 UR/3158/65/000/012/0001/0012

AUTHOR: Rabotnov, N. S.; Smirenkin, G. N.; Soldatov, A. S.; Usachev, L. N.; Kapitsa, S. P.; Tsipenyuk, Yu. M.

TITLE: Angular photofission anisotropy and parity of the ground state of plutonium-239

SOURCE: Obninsk. Fiziko-energeticheskiy institut. Doklady, no. 12, 1965. Uglovaya anizotropiya fotodeleniya i chetnost' osnovnogo sostoyaniya plutoniya-239, 1-12

TOPIC TAGS: nuclear fission, plutonium, ground state, bremsstrahlung

ABSTRACT: The angular distributions of fragments resulting from the photofission of Pu^{239} were measured by γ quanta of the bremsstrahlung of a microtron in the range of limiting energies of E_{max}=5.4-7.9 Mev. At E_{max}=5.4, 5.65, and 5.9 Mev, anisotropic angular distributions of the form $W(\sigma) = a+b \sin^2\sigma$ were observed. The maximum anisotropy, which corresponds to $\frac{b}{a} = -0.192$, was recorded at E_{max}= =5.65 Mev. Comparison of the results with data on the fission of Pu^{238} by neutrons permits the determination of the parity of the ground state of Pu^{239} relative to

Card 1/2

L 1954-66 2
ACCESSION NR: AT5024113

the parity of the ground state of the even-even nucleus. Data on the fission agree with the positive parity of the ground state of Pu^{239}, which follows from spectroscopic data. Orig. art. has: 2 figures, 1 table, 10 formulas.

ASSOCIATION: Fiziko-energeticheskiy institut GKIAE (Physics and Energetics Institute GKIAE); Institut fizicheskikh problem (Institute of Physical Problems)

SUBMITTED: 00 ENCL: 00 SUB CODE: NP

NO REF SOV: 003 OTHER: 009

Card 2/2

SMIRENKIN, G.N., red.; SMIRNOV, M.A., red.

[Progress in the physics of nuclear fission. Translated from the English and German] Uspekhi fiziki deleniia iader; sbornik statei. Moskva, Atomizdat, 1965. 305 p.
(MIRA 19:1)

SOLDATOV, A.S.; ALEKSANDROVA, Z.A.; GORDEYEVA, L.D.; SMIRENKIN, G.N.

Angular distribution of fragments in the photofission of U^{238} and Th^{232} by gamma rays from the reaction $F^{19}(p,\alpha\gamma)O^{16}$. IAd. fiz. 1 no.3:471-475 Mr '65. (MIRA 18:5)

L 27871-66 EWT(m)/EWA(h)

ACCESSION NR: AP5021112 UR/0056/65/049/002/0476/0484

AUTHORS: Bocharova, I. Ye.; Zolotukhin, V. G.; Kapitsa, S. P.; Smirenkin, G. N.; Soldatov, A. S.; Tsipenyuk, Yu. M.

TITLE: Angular distribution of U-238 photofission fragments near the fission threshold

SOURCE: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 49, no. 2, 1965, 476-484

TOPIC TAGS: uranium, photonulcear reaction, nuclear fission, angular distribution, fission product

ABSTRACT: A preliminary report on this research was published in Physics Letters v. 14, 217, 1965. To observe quadrupole fission experimentally, the angular distribution of the fragments emitted in photofission of U^{238} near threshold were measured by recording the fission events in glass. The photons were produced by electrons accelerated in the 12-MeV high-current microtron of IFP AN SSSR (Institute of Physics Problems, AN SSSR). The angular distributions of

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the fragments were measured at proton energies 5.2, 5.4, 5.65, 5.9, 6.4, 6.9, and 9.25 MeV. The immediate purpose was to detect the component proportional to $\sin^2 2\theta$ in the angular distribution, which should be due to the $2^+(K = 0)$ channel in quadrupole photon absorption which has been shown to have a much lower cross section than dipole absorption (K -- projection of the total angular momentum on the fission axis). The experimental results confirm the hypothesis by A. Bohr (International Conference on Peaceful Uses of Atomic Energy, Geneva 1955, v. 2, Fizmatgiz 1958, page 175) regarding the similarity of the fission-channel spectrum and the lower-excited-level spectrum near the ground state of the equilibrium nucleus. The distance between the threshold of the fission channels for 2^+ and 1^-, $(K = 0)$ as well as 1^-, $(K = 0)$ and 1^-, $(K = 1)$ is not less than 0.5 MeV. Other important results of the research are the high anisotropy of photofission for low photon energies, and the appreciable distance between thresholds of the fission channels 2^+ and 1^- $(K = 0)$ on the

L 27871-66
ACCESSION NR: AP5021112

one hand 1^- (K = 1) on the other. A more detailed analysis will be made after data are obtained on the photofission of Th^{232} and Pu^{240}.
'The authors thank L. N. Usachev and N. S. Rabotnov for interest and helpful discussions, P. L. Kapitsa for supporting the research, and M. K. Golubeva, L. D. Gordeyeva and N. Ye. Fedorova for participation in the work.' Orig. art. has: 6 figures, 4 formulas, and 1 table.

ASSOCIATION: Institut fizicheskikh problem Akademii nauk SSSR (Institute of Physical Problems, Academy of Sciences, SSSR)

SUBMITTED: 31Mar65 ENCL: 00 SUB CODE: NP

NR REF SOV: 007 OTHER: 008

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ACC NR: AT7004869

channels of division of the Th^{232} nucleus and showed considerable vagueness in channel analysis, related to the lack of understanding of the partial cross sections in the formation of a compound nucleus. The authors thank A. S. Soldatov, and V. S. Stavinskiy for their advice and discussion of the work, and G. V. Anikin and V. Ye. Kolesov for assistance in the calculations. Orig. art. has: 2 figures and 3 formulas. [Authors' abstract] [SP]

SUB CODE: 20/SUBM DATE: none/ORIG REF: 004/OTH REF: 007/

Card 2/2

SMIRENKIN, Petr Pavlovich, professor; ARONOV, P.I., redaktor; AKATOVA, V.G., redaktor izdatel'stva; ZHOROV, D.M., tekhnicheskiy redaktor.

[Foundations and footings] Osnovaniia i fundamenty. Moskva, Izd-vo M-va kommun.khoziaistva RSFSR, 1956. 189 p. (MLRA 10:4)
(Foundations)

KLEYN, Georgiy Konstantinovich, prof.; SMIRENKIN, P.P., prof. [deceased]; MARTYNOV, A.P., red.; VORONINA, R.K., tekhn. red.

[Bases and foundations] Osnovaniia i fundamenty. Izd.4., perer. Moskva, Gos. izd-vo "Vysshaia shkola," 1961. 211 p. (MIRA 15:3)

(Foundations)